ARTHRITIS AND THE CHICKEN ANKLE JOINT

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Pain resulting from orthopaedic disease in birds continues to be a welfare issue. Recent research has shown that arthritis results in sensitization of joint receptors which could form the basis of spontaneous pain, hyperalgesia and allodynia seen in inflammation. The relationship between the peripheral sensory afferents in the joint and the painful changes seen in arthritis are not fully understood. The aim of this work is to investigate the complex relationship between the peripheral nervous system and pain in naturally occurring orthopaedic disease. A pilot project was undertaken at the Roslin Institute, with Animal Ethics clearance, to investigate the effects of inflammation on substance P nerve fibres which are involved in inflammation and transmission of pain.

Pullets were injected with sodium urate microcrystals into the left ankle joint. The right ankle joint served as the control and received either saline or was not injected. Four hours after injection the left ankle joint developed gout and the birds were killed and the joint capsule and synovial membrane of both ankle joints were removed. After fixation of the tissue, the substance P nerve fibres were visualized using immunofluorescence. The tissue was examined using a laser confocal microscope.

Substance P containing nerve fibres were identified in both the synovial and subsynovial tissue. It is likely that some of these substance P fibres will be part of the population of fibres in which physiological responses have been investigated in both health and disease (Gentle, 1997). Fewer substance P fibres were observed in the inflamed joints compared with the controls.

These findings would support the hypothesis that during major inflammatory joint disease, substance P in the peripheral afferent nerve fibres is being released faster that it can be produced. This pilot study has for the first time shown the distribution of substance P nerve fibres in the joints of birds in both health and disease. It has been demonstrated that even short duration acute inflammation can have a profound effect on neuropeptide content of peripheral nerve fibres and this work forms the basis in which to study not only substance P but also how other neuropeptides may be affected by the disease process.


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